

them a large collection of apparatus employed in various parts of the course was laid out.

Although not termed a museum, the teaching collections of minerals, rocks, fossils, &c., at the Science Schools are sufficiently full and complete for the most advanced student. Some time was spent in these rooms; as many of the members of the Association are engaged in teaching science they examined the arrangements with much interest. The elementary collections, which every student is required to know thoroughly, are arranged in table-cases always open to inspection; the more advanced collections are in drawers beneath. Over the table-cases and drawers which contain the fossils there are coloured vertical sections and diagrams of the geological formations and their subdivisions, showing the variations in their development in different districts.

In the Biological and Geological Lecture-Room an address was delivered by Mr. G. A. Cole, Prof. Judd's chief assistant, on "The Preparation of Microscopic Sections of Rocks and Minerals," illustrated by the apparatus employed and by drawings upon the blackboard.

From the lecture-room the party passed into the biological laboratory, upon the table of which, for this occasion, were placed a large number of microscopes, with sections of rocks and minerals, each with its name attached. From this the visitors passed into the advanced and research laboratories for geology, and thence down the main staircase to the entrance-hall.

PHOTOGRAPHIC STUDY OF STELLAR SPECTRA

Henry Draper Memorial

THE study of stellar spectra by means of photography was one of the most important investigations undertaken by the late Prof. Henry Draper. He was actively engaged in this research during the last years of his life. His plans included an extensive investigation, one object of which was to catalogue and classify the stars by their spectra. Mrs. Henry Draper has made provision, at the Observatory of Harvard College, for continuing these researches, as a memorial to her husband. The results already obtained, with the aid of an appropriation from the Bache Fund, permit the form of the new investigation to be definitely stated. The part of the sky to be surveyed is that extending from the North Pole to the parallel of 30° south declination. Each photograph will be exposed for about one hour, and will include a region 10° square. The telescope employed has an aperture of 20 centimetres (8 inches), and a focal length of 117 centimetres (44 inches). The object-glass is covered by a prism, and the resulting spectrum of each star in the region photographed has a length of about 1 centimetre; which enables the character of the spectra of stars from the fifth to the eighth magnitude to be determined. A modification of the apparatus is employed for the brighter stars.

Meanwhile, experiments are in progress with the 15-inch equatorial, with the object of representing the spectra of some typical stars upon a large scale. The spectra so far obtained are about 6 centimetres in length, and exhibit much well-defined detail. Additional experiments will be tried with a spectroscope provided with a slit, as well as with the simple prism hitherto employed, in order to secure the best possible definition. The present results encourage the expectation that the movements of stars in the line of sight may be better determined by the photographic method than by direct observations.

To keep the astronomical public informed of the progress made in this work, specimens of the photographs obtained will be gratuitously distributed from time to time. The first of these distributions will prob-

ably be made in a few weeks. Owing to the expense of providing a large number of copies, it is desirable to limit the distribution, as far as possible, to those who are interested in this class of work. It is also desired, however, to send the specimens to all who will find them of value from the scientific point of view. A blank form of request is attached to the present circular, and may be filled out and sent to the Harvard College Observatory by any one desirous of receiving the specimens; but requests to the same effect in any form which may be convenient will also be cheerfully complied with so far as may prove practicable.

EDWARD C. PICKERING,

Director of Harvard College Observatory
Cambridge, U.S., March 20

SOLAR HALO WITH PARHELIA

ON Thursday, April 1, a solar halo with parhelia was seen here, in regard to which, with the consent of the Astronomer-Royal, I beg herewith to offer a few particulars. The best display occurred between 1h. 30m. and 2h. p.m., and at one time exhibited the following appearance. There was the large halo commonly seen, in addition to which a luminous ring passing through the sun encircled the sky, everywhere of the same altitude above the horizon, forming a small circle of the sphere taking the zenith as pole. On this, the parhelic circle, and outside of the halo by about 5° , a mock sun was seen both on the eastern and western sides; another was seen in about a north-north-west direction, and a fourth nearly east, both also situated on the circle.

Calling the real sun S , and the several mock suns, counting westward, S_1, S_2, S_3, S_4 , differences of azimuth were independently estimated as follows:—

	S to S_2	S_2 to S_3	S_3 to S
By myself, numerical estimation ...	115°	130°	115°
By Mr. Nash, by estimation ...	120°	120°	120°
By Mr. Lewis, measured from a sketch ...	123°	115°	122°
Mean ...	119°	122°	119°

apparently indicating that the true difference of azimuth was in each case 120° .

Mr. Turner states that S_4 was on the meridian at 1h. 55m., at which time the calculated azimuth of S from south was 36° , which is therefore the difference of azimuth between S_4 and S . I estimated this difference to be 31° , Mr. Nash 35° , and Mr. Lewis 35° . Mean = 34° . This azimuthal measure corresponds to about 27° as measured on a great circle at about the position of the sun. Deducting 5° , the estimated amount by which S_1 or S_4 was outside the halo, we have 22° for an approximate value of the radius of the halo, about the usual magnitude.

The evidence that the altitude of the circle on which the suns were seen was everywhere the same is as follows:—At 2h. the altitude of the sun, by direct calculation, was 37° . At the same time Mr. Turner, by measurement with the transit-circle, found the altitude of the circle at the point at which it crossed the north meridian to be 37° , it being well seen; its altitude on the south meridian appeared to be 40° , but the circle at this moment was not distinctly visible at this point. At 2h. 15m. Mr. Turner found, with the altazimuth, the altitude of both S_2 and S_3 to be 35° , which, allowing for change of altitude, gives $36\frac{1}{2}^\circ$ for the corresponding altitude at 2h.

There were great variations in brilliancy of the different parts during the interval first mentioned, and some of the appearances were visible at a much later hour. The suns S_1 and S_4 at times exhibited prismatic colours in a marked manner.

Two mock suns, such as at times accompany the ordinary halo, were seen also on April 2, and a simple halo also on April 3.

WILLIAM ELLIS

Royal Observatory, Greenwich, April 5

NOTES

WE learn that, at the request of the Royal Society, the Treasury has agreed to insert a sum in the estimates, and the Admiralty has agreed to furnish transport and assistance, in aid of an expedition to observe the total eclipse of the sun, visible in the island of Grenada (West Indies) on August 29 next. The Expedition, which will consist of seven observers, will leave England on July 29 in the Royal Mail s.s. *Nile*. According to present arrangements a ship-of-war will meet them at Barbados, and take them on to their various stations. It is a noteworthy sign of the interest taken in such national work by our great public companies that the Directors of the Royal Mail Company have enabled the Eclipse Committee of the Royal Society to increase the number of observers beyond that at first contemplated by a concession in their terms which amounts to an important endowment of the expedition.

MR. H. FOWLER stated in Parliament the other day that the final report of the expeditions to observe the transit of Venus in 1882, subsidised by the British Government to the extent of 14,680*l.*, would be presented in June.

WE have already announced the death, on March 20, at Leyton, Essex, of Mr. Charles George Talmage, F.R.A.S., in the forty-sixth year of his age. Mr. Talmage, who was well known as a skilful astronomical observer, had the entire direction of Mr. J. Gurney Barclay's observatory at Leyton for more than twenty years. During this period he turned his attention chiefly to observations of double stars, and the results of his work are given in four volumes of the "*Leyton Astronomical Observations*." Previous to his appointment to this post he had served his apprenticeship to astronomy at the Royal Observatory, Greenwich, in the years 1856-60, had worked under Mr. Hind at Mr. Bishop's observatory, first at Regent's Park, and then at Twickenham, and had spent four years at Nice in order the better to prosecute the work on which he was then engaged, the revision of Admiral Smyth's Bedford Catalogue. He was sent to Gibraltar in 1870 to observe the total solar eclipse of that year, and was placed in charge of the Transit of Venus Expedition to Barbadoes in 1882. His death will be much regretted in the astronomical world and by his numerous friends.

MR. EDWARD SOLLY, F.R.S., F.S.A., died on Friday at Camden House, Sutton, Surrey, in his sixty-seventh year. Educated at Berlin, he was appointed chemist to the Royal Asiatic Society in 1838, Lecturer on Chemistry at the Royal Institution in 1841, honorary member of the Royal Agricultural Society in 1842, Fellow of the Royal Society in 1843, Professor of Chemistry in the East India Company's Military College at Addiscombe in 1845, and honorary Professor of Chemistry to the Horticultural Society in 1846. Besides several works in which the importance of chemistry to agriculture was maintained, he wrote "*Rural Chemistry*" (1843) and "*Syllabus of Chemistry*" (1849).

MR. RICHARD EDMONDS, the seismologist and antiquary, died recently at Plymouth in his 85th year. He closely studied the extraordinary agitations of the sea and earthquake shocks, and published the results of his investigations in the *Edinburgh New Philosophical Journal*, the *British Association Reports*, and the *Transactions* of the Royal Society of Cornwall. In 1862 Mr. Edmonds published a collection of his papers, under the title of "*The Land's End District; its Antiquities, Natural History, Natural Phenomena, and Scenery*."

PROF. OLIVER LODGE will give the first of two lectures at the Royal Institution on Saturday next (April 10) on Fuel and Smoke considered with reference to the scientific principles underlying the use of the one and the avoidance of the other. The following arrangements are announced for the Royal Institution lectures after Easter:—Prof. Gamgee, six lectures on the Function of Circulation; Prof. Dewar, three lectures; Prof. A. Macalister, three lectures on Habit as a Factor in Human Morphology; Prof. Ernst Pauer, three lectures on How to Form a Judgment on Musical Works; and Prof. G. G. Stokes, Pres. R.S., three lectures. The first Friday evening discourse will be given by Mr. Frederick Siemens on Dissociation; and succeeding discourses will probably be given by Prof. J. M. Thomson, Sir John Lubbock, Bart., M.P., Prof. O. Lodge, Dr. W. H. Gaskell, and Prof. Dewar.

THE seventh International Oriental Congress will be held at Vienna on September 27 next and following days.

As the work of unpacking the cases which arrive daily at South Kensington from the British colonies all over the world proceeds, the extraordinary variety and interest of the exhibits become more apparent. In addition to objects of specially scientific interest already referred to, we may mention the ethnological groups in the south or Imperial Court of the Indian section. These are intended to illustrate the physiognomy, dress, and customs of the various races inhabiting the Indian Empire. The collection of woods from the Andaman and Nicobar Islands, shown at the Forestry Exhibition at Edinburgh, has been greatly enlarged, especially by specimens of timber of extraordinary size from the Andamans, and will be shown in the Indian section. One of these, the *Diospyros Kurzii*, a marble wood, resembles a combination of oak and ebony. There will be two timber trophies from the Indian Forest Department; one will be a triple arch 46 feet broad by 15 feet high, containing over 300 kinds of wood, while the second will be formed wholly of bamboo, of which thirty species will be shown. The most original arrangement of woods, however, is that adopted in the Victorian Court. Each specimen is in the shape of an octavo volume, on the back being printed, as a title and place of publication, the scientific name of the wood and the locality whence it came. The whole collection is inclosed in a handsome book-case, and so resembles a small library. Prof. McCoy and Baron von Müller have prepared a large natural history collection, and one of rare plants from Victoria in albums. The entomological collection is said to be remarkably complete, upwards of a thousand distinct specimens of insects being included. The Melbourne Botanical Gardens send a collection of fibres and carpological specimens. In a natural history case in the Canadian section, prepared by Col. Stockwell, will be a general representation of the fauna and flora of Anticosti. New Guinea has been taken under the wing of Queensland, and collections from that island will be explained by Mr. Hugh Romilly, who will be appointed Assistant Commissioner for Queensland specially on this account. The trophies in the various sections will also be of great interest and beauty; Ceylon will have a natural history trophy, India a jungle trophy, Queensland two of natural history—one being animals, the other birds—and so for other courts. It may be hoped that one result of this Exhibition and of the meeting of colonists from all quarters of the globe simultaneously in London will be the establishment of a permanent colonial museum in London. The Exhibition will supply abundant materials with which to make a beginning.

IN commemoration of the fiftieth year of the foundation of the Museum of Native Antiquities at Kiel, the directress, Fräulein Mestorf, has published a hand-book on the prehistoric antiquities of Schleswig-Holstein, containing 62 plates with 765 pictures of